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Application Date: May 7, 1945.

No. 11653/45.

" " March 4, 1946.

No. 6715/46.

One Complete Specification left (under Section 16 of the Patents and Designs Acts, 1907 to 1946): June 6, 1946.

Specification Accepted: Oct. 16, 1947.

## PROVISIONAL SPECIFICATION

No. 11653 A.D. 1945.

## Improvements in or relating to Framed Buildings

We, CHARLES FREDERICK ELLIOTT, a British Subject, of 4, Buci Crescent, Shoreham-by-Sea, Sussex, and BASIL MONK, a British Subject, of Trojan Works, Purley Way, Croydon, Surrey, do hereby declare the nature of this invention to be as follows:—

This invention relates to framed buildings of the kind in which the walls are formed by slabs or panels secured between uprights which form a part of the frame of the building, and an object of the invention is to provide means whereby attachment of the slabs or panels to the uprights is facilitated, and whereby said panels contribute to the protection of the uprights from the weather.

According to this invention, a building comprises a frame having a number of uprights spaced apart, and each provided with laterally-extending flanges or lugs, on either side thereof, and slabs or panels having slots or grooves along their side edges engageable with said flanges or lugs and so arranged that when the slabs are in position on opposite sides of an upright, they obscure the faces of said flanges or lugs, on the weather side of the structure.

The aforesaid flanges or lugs may be arranged to provide on each upright, channels which, between adjacent uprights, face one another, and the slots in the sides of the slabs or panels are so formed as to engage at least one side flange of each channel and so as to provide a portion which lies between the walls of the channel.

Each said upright may be provided with two sets of flanges which are arranged to be engageable with slots in two sets of slabs or panels, so as to space said two sets apart, and form a double wall.

It will be appreciated with the above arrangement, that a number of uprights may be spaced apart across the width of the walls and the immediate uprights may be provided with the aforesaid flanges or channels on either side thereof.

[Pri

Uprights suitable for the corners of the building may be provided in which each of them has flanges and/or channels extending on two sides thereof at a suitable angle, for example, at right-angles to one another.

The aforesaid flanges may either be continuous from top to bottom of the uprights or, particularly in the case where two sets of channels are provided, for a double wall structure, the web portion of the upright is formed with lugs which may be bent therefrom in opposite directions so as to form discontinuous flanges or channels. With such an arrangement, the upright may be formed from a single strip of sheet steel.

In the case where two sets of channels are provided on an upright, the web portion between the channels may be apertured to provide ventilating openings.

The aforesaid uprights may be tied across their tops by beams.

In the case where each upright is provided with two sets of channels for forming a double wall, the web portion of the upright between the two channels may at its upper end be arranged below the tops of the channels so as to form a socket for accommodating said beam, the top of which is arranged to lie flush with the tops of the channels. A platform for supporting said beam may be formed by a ledge secured to the top of said web portion between the channels; the beam may be secured to said platform by suitable bolts.

The foundation for the building may be provided with upstanding ridges or flanges delineating the sides of the building, and the lower ends of the uprights may be slotted to straddle said ridges, whereby the uprights are aligned and the ribs or channels brought accurately opposite one another.

Locating means may be provided on the foundation ridge or flange for spacing the uprights the required distance apart for the width of slab or panel being employed.

The distance apart of said uprights and the width of the slabs or panels are so selected that by omitting certain panels in the different courses, a standard door opening or window opening may be provided. In the case of window openings, certain portions of one upright may also be omitted.

In the above arrangements, after the uprights have been erected, the slabs or panels may either be lifted to the top of the uprights and have the ends of the slots or grooves in their sides engaged with the appropriate flanges and then lowered, or in the case where the uprights are provided with interrupted flanges and channels, similarly spaced interruptions may be provided in one of the walls of the slab or panel flanking the groove or slot so that the interrupted flanges on the uprights may be inserted through the interruptions in the slab or panel which is lowered so as to engage the interrupted flanges with the grooves. With this latter arrangement, it is not necessary to lift the blocks much higher than their final position. The interrupted wall of

the groove is arranged on the inner side of the panel.

The aforesaid slabs or panels may be moulded from various materials, such as concrete or cement, e.g., asbestos cement, with or without reinforcements, and they may be as large in size as can be conveniently handled, thereby reducing the time for erecting the building.

The top and bottom edges of said slabs or panels may be provided with rebates so that the slabs or panels in different courses overlap one another, while retaining their faces in alignment.

The upper and lower faces of the rebates may be slightly inclined to the horizontal in such a manner as to prevent moisture being trapped in the joints between them.

Certain of the slabs or panels may be provided with ventilating openings.

Dated this 7th day of May, 1945.  
BOULT, WADE & TENNANT,  
111 & 112, Hatton Garden,  
London, E.C.1,  
Chartered Patent Agents.

## PROVISIONAL SPECIFICATION

No. 6715 A.D. 1946.

### Improvements in or relating to Framed Buildings

We, CHARLES FREDERICK ELLIOTT, a British Subject, of 4, Buci Crescent, Shoreham-by-Sea, Sussex, and BASIL MONK, a British Subject, of Trojan Works, Purley Way, Croydon, Surrey, do hereby declare the nature of this invention to be as follows:—

This invention relates to framed buildings of the kind in which the walls are formed by slabs or panels secured between uprights which form a part of the building frame and more particularly relates to a framed building such as is described in the specification of Application No. 11653/45.

It is important that the aforesaid uprights are spaced accurately at predetermined distances apart in order that there may be assembled between them mass-produced slabs or panels. In the construction according to the above-mentioned specification, this spacing is effected by providing the foundation of the building with upstanding ridges or flanges and by slotting the lower ends of the uprights so as to straddle said ridges, and by providing locating means on said ridges or flanges, while the upper ends of the uprights were tied together by suitable beams.

According to the present invention, a

framed building of the kind first referred to above is characterised in that the lower ends of the uprights are accurately spaced apart on a prefabricated foundation member by pin and socket connections. The upper ends may likewise be accurately spaced apart by pin and socket connections between them and the cross beams.

The aforesaid foundation members and cross members may comprise channel-section members and the aforesaid pin and socket connections may comprise pins accurately spaced apart along the web portions of the channels and laterally extending lugs formed on or attached to the said uprights, which lugs are drilled to receive said pins. With such an arrangement, the channel-section members and uprights may be accurately machined at a factory with the certainty that when assembled they will accommodate slabs or panels also previously mass-produced in a factory. The ends of the uprights may be provided with two oppositely extending drilled lugs or angle pieces and at each location on the channel members where the uprights are to be erected two pins or bolts are provided. It may not be practicable to provide a single length of channel member along a side of a building, and thus two or more channels are

provided which may be arranged to overlap at the locations where the uprights are to be erected, and the pins or bolts for locating the uprights may be arranged to fulfil the additional function of securing the channel members together. For this purpose, those ends of the channel members which are to overlap are each provided with a hole and a pin so spaced apart that the pin on each channel engages the hole on the other channel and so that the two pins are spaced at the required distance apart for engaging the holes in the lugs or angle pieces on the uprights.

In the case where the uprights are each provided with two flanges for engaging two sets of slabs to form a double wall, the width of the aforesaid channel members is such that they lie between the two sets of slabs, preferably to provide a gap.

As in the construction of specification No. 11653/45, the web portions of the uprights may be slotted to straddle the flanges of the channel members, so that the uprights are laterally located. The slotting may be such that the lower ends of the uprights rest directly on a foundation course.

In the case of a multi-storey building, separate uprights are provided for each storey and are arranged one above the other either in line or in staggered relationship and abut on either side of said channel members which extend across their ends. In such a case, the aforesaid pins extend through lugs or angle pieces at the upper ends of the pillars, through the webs of the channel members and through the lugs or angle pieces at the lower ends of the pillars of the next storey. These pins preferably comprise bolts which thus firmly clamp the superimposed pillars together on either side of the channel members.

The channel members at the upper ends of the upright members are preferably inverted.

In order to increase the rigidity of the frame, the upright members at the corners of the structure may be cross-braced to the neighbouring uprights. The cross braces may comprise rods and the ends thereof may be arranged to constitute the pins or bolts which engage the lugs at the ends of the uprights.

As indicated in Specification No. 11653/45, the uprights may be formed from sheet metal along the edges of which are formed parallel transverse slits and the metal between the slits is bent alternately in opposite directions to form a channel member with gapped flanges, while the slabs are cast with slots along opposite edges with one wall of each slot gapped so as to enable it to be passed laterally through the gapped flange of an upright.

According to the present invention, the slits are arranged to be V-shaped so that each part of the interrupted flange is tapered, thereby facilitating the assembly of the slabs.

The top and/or bottom edges of each slab may be provided with a channel, preferably V-shaped in cross-section. The channels may be filled with appropriate jointing material before assemblage of the slabs above them.

In the case where a double wall is to be formed the faces of the slabs which border the cavity in the wall may be recessed for lightening purposes. The outermost slabs may be formed from cement, while the inner slabs may be formed from breeze.

Dated this 4th day of March, 1946.

BOULT, WADE & TENNANT,  
111 & 112, Hatton Garden,  
London, E.C.1,  
Chartered Patent Agents.

## COMPLETE SPECIFICATION

### Improvements in or relating to Framed Buildings

We, CHARLES FREDERICK ELLIOTT, a British Subject, of 4, Buci Crescent, Shoreham-by-Sea, Sussex, and BASIL MONK, a British Subject, of Trojan Works, Purley Way, Croydon, Surrey, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to framed buildings of the kind in which the walls are formed by slabs or panels secured between uprights which form a part of the frame

of the building, and an object of the invention is to provide means whereby attachment of the slabs or panels to the uprights is facilitated, and whereby said panels contribute to the protection of the uprights from the weather.

According to this invention, a building comprises a number of uprights spaced apart and provided with laterally-extending interrupted flanges so that the flanges on adjacent uprights are directed towards one another and slabs or panels having slots or grooves along their upright sides, one of the walls flanking each said slot or

groove being interrupted in a similar manner to said flanges, so that flanges on the uprights can be entered into the slots or grooves through interruptions in said wall.

5 The aforesaid flanges or lugs may be arranged to provide on each upright, channels which, between adjacent uprights, face one another, and the slots in the sides of the slabs or panels are so formed as to engage, at least one side flange of each channel.

10 The flanges provided by said channel may be arranged to engage respectively slots in two sets of slabs or panels, so as to space said two sets apart and form a double wall.

Each interrupted flange may be formed by lugs bent out of the material of the upright so as to extend alternately in opposite directions. With such an arrangement the uprights may be formed from a single strip of sheet steel, the edges of which are slit and the material between the slits being bent in alternate directions.

The web portion between the flanges may be apertured to provide ventilating openings.

30 The foundation for the building may be provided with upstanding ridges or flanges delineating the sides of the building, and the lower ends of the uprights may be slotted to straddle said ridges, whereby the uprights are aligned and the ribs or channels brought accurately opposite one another.

For example the foundation of the building may be provided with a channel member and the web portion of the uprights may be slotted to engage the side flanges of the channel.

40 Locating means may be provided on the foundation member for spacing the uprights the required distance apart for the width of slab or panel being employed. For example, the upper and the lower ends of the uprights are accurately spaced apart along a top horizontal member and along a prefabricated foundation by pin and socket connections. The upper ends may likewise be accurately spaced apart by pin and socket connections between them and the cross beams.

55 The aforesaid pin and socket connections may comprise pins accurately spaced apart along the web portions of the channels and laterally extending lugs formed on or attached to the said uprights, which lugs are drilled to receive said pins. With such an arrangement, the channel-section members and uprights may be accurately machined at a factory with the certainty that when assembled they will accommodate slabs or

panels also previously mass-produced in a factory. The ends of the uprights may be provided with two oppositely extending drilled lugs or angle pieces and at each location on the channel members where the uprights are to be erected two pins or bolts are provided. It may not be practicable to provide a single length of channel member along a side of a building, and thus two or more channels are provided which may be arranged to overlap at the locations where the uprights are to be erected, and the pins or bolts for locating the uprights may be arranged to fulfil the additional function of securing the channel members together. For this purpose, those ends of the channel members which are to overlap are each provided with a hole and a pin so spaced apart that the pin on each channel engages the hole on the other channel and so that the two pins are spaced at the required distance apart for engaging the holes in the lugs or angle pieces on the uprights.

In the case where the uprights are each provided with two flanges for engaging two sets of slabs to form a double wall, the width of the aforesaid channel members is such that they lie between the two sets of slabs, preferably to provide a gap.

As indicated above, the web portions of the uprights may be slotted to straddle the flanges of the channel members, so that the uprights are laterally located. The slotting may be such that the lower ends of the uprights rest directly on a foundation course.

In the case of a multi-storey building, separate uprights are provided for each storey and are arranged one above the other either in line or in staggered relationship and abut on either side of said channel members which extend across their ends. In such a case, the aforesaid pins extend through lugs or angle pieces at the upper ends of the pillars, through the webs of the channel members and through the lugs or angle pieces at the lower ends of the pillars of the next storey. These pins preferably comprise bolts which thus firmly clamp the superimposed pillars together on either side of the channel members.

The distance apart of said uprights and the width of the slabs or panels are so selected that by omitting certain panels in the different courses, a standard door opening or window opening may be provided. In the case of window openings, certain portions of one upright may also be omitted.

In the above arrangements, after the uprights have been erected, the interrupted flanges on the uprights may be inserted through the interruptions in the

slab or panel which is lowered so as to engage the interrupted flanges with the grooves. With this arrangement, it is not necessary to lift the blocks much higher than their final position. The interrupted wall of the groove is arranged on the inner side of the panel.

The following is a description of the various constructional units for the building according to this invention, reference being made to the accompanying drawings, in which:—

Figure 1 is a perspective view of an intermediate upright mounted on a base and having two slabs engaged with one of its interrupted flanges.

Figure 2 is a perspective view showing two uprights mounted, one above the other, and having horizontal members secured on either side thereof;

Figure 3 is a horizontal section through two uprights above the joints referred to in Figure 2;

Figure 4 is a perspective elevation of a corner of a structure showing cross-bracing of the framework;

Figure 5 is a more detailed view of one section of cross-bracing, shown in Figure 4;

Figure 6 is a perspective plan view of the top of the building at one corner thereof;

Figure 7 is a perspective view of the ends of the channel members which locate and support said uprights;

Figure 8 is a face view of a part of a metal strip before it is formed into an upright, and

Figure 9 is a face view of one of the slabs on the inner side thereof.

Referring to Figure 1, it will be seen that the upright 10 is formed along each edge thereof with oppositely extending interrupted flanges 11 and 12. The interrupted flanges on one edge are arranged in staggered relationship with the interrupted flanges on the other edge. As will be seen in Figure 3, this form of construction, in effect, provides an I-section strut. The uprights may be formed from a single sheet of metal, as shown in Figure 8, the opposite edges of which are provided with a number of narrow V slots, and the lugs thus formed are alternately bent in opposite directions. The upper and lower ends of the uprights are slotted at 14 (see Figures 1 and 2) which slotted portions straddle the flanges or channel members 15 at the lower ends of the uprights, and straddle the flanges of a horizontal channel member 16 at the upper ends. The channel member 15 may be partly inset in a concrete base course 7, where it is held by rag bolts 17 which pass through holes in the web por-

tion of the channel member. The uprights may be accurately spaced apart along the channel member 15 by means of studs 18 which pass through holes formed in an angle member 19 secured on each side of the upright member. These studs in the channel-section member may be accurately located in a pre-fabricating operation. In the case where a number of channel members are arranged to extend along a base course, they may be secured together in overlapping relationship by providing at both ends of each of them, as shown in Figure 7, a hole 20 and an upstanding pin or stud 21, the hole at the end of one channel member being arranged to be passed over the peg or stud on the other member, which holes and studs are so disposed that when the two members are joined together, the two pins or studs are spaced apart a required distance for engaging the holes in the aforesaid angle members, the lengths of the horizontal members being so chosen that the joints come immediately beneath an upright. Two or more uprights may be arranged one above the other and the upper end of one may be secured to the lower end of another and also to horizontal member 16 on either side thereof by means of the angle member 24 as shown in Figures 2 and 3. The width of the horizontal member 16 is such that when the slabs are assembled in position a gap is provided between their inner faces and the sides of the horizontal member thus preventing the accumulation of moisture and facilitating ventilation. The webs of the uprights may also be provided with apertures 8. Preferably, the horizontal channel member which attaches together the upper ends of those upright members 10 which are arranged at the top of the building, is inverted, as shown in Figure 6, and the adjoining horizontal channel members at the corner of the building are held together by a triangular corner plate 22. As will be seen from Figures 4 and 5, the upright members are cross-braced by tie rods 23. It may only be necessary however for the two uprights on either side of the corner to be so braced. Referring to Figure 2, the horizontal members 16 are secured on either side of two of the uprights by means of angle plates 24 disposed above and below each horizontal member.

As will be seen from Figure 5, the ends of certain of the tie rods 23 at the corner of the building may be threaded at 25, and may be arranged to extend through holes in the angle plates 24 and through eyes 26 formed at the ends of the other tie rods 23. The threaded portions are provided with nuts 27 and thus serve to

clamp together the ends of the uprights and at the same time the ends of adjacent horizontal members 16. Similarly, the lower extremities of the tie rods 23 for the lower part of the framework may be provided with eyes 26 which are threaded over the studs 18 on the lower channel member 15.

The slabs 28 for assembling between the uprights are each provided with grooves 29 along each upright edge thereof, and the wall flanking the grooves on the inner side of each slab is interrupted at 30 in a manner corresponding to the interruptions of the flanges of the uprights, the arrangement being such that the flanges on the uprights may be inserted through the gaps in the edges of the slabs, so that they enter the grooves, whereupon the slabs are lowered until the flanges overlap the solid portions of the walls of the grooves. By this means, the slabs do not require to be lifted very much higher than the location which they are eventually to assume. The horizontal edges of the slabs may be provided with V-shaped grooves 31 for the reception of grouting material, and if desired, the focus of these edges are inclined to a horizontal plane in such manner that moisture does not tend to collect. The inner faces of the slabs may be recessed at 32, as shown in Figure 9, for lightening purposes.

In the case of a multi-storey building instead of the uprights being arranged one above the other in line they may be displaced from one another.

The aforesaid slabs or panels may be moulded from various materials, such as concrete or cement, e.g. asbestos cement, with or without reinforcements, and they may be as large in size as can be conveniently handled, thereby reducing the time for erecting the building.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

1. A framed building comprising a number of uprights spaced apart and provided with laterally-extending interrupted flanges so that the flanges on adjacent uprights are directed towards one another and slabs or panels having slots or grooves along their upright sides, one of the walls flanking each said slot or groove being interrupted in a similar manner to said flanges so that flanges on the uprights can be entered into the slots or grooves through interruptions in said wall.

2. A framed building according to Claim 1, wherein the flanges or lugs are

arranged to provide on each upright, channels which, between adjacent uprights, face one another, and wherein the slots in the sides of the slabs or panels are so formed as to engage at least one side flange of each channel.

3. A framed building according to Claim 2, wherein the two flanges forming each channel are arranged to engage respectively slots in two sets of slabs or panels, so as to space said sets apart, and form a double wall.

4. A framed building according to any of the preceding claims, wherein each said interrupted flange is formed by lugs bent out of the material of the upright so as to extend alternately in opposite directions.

5. An upright for a framed building according to Claim 4, which is formed from a single strip of sheet of metal, the edges of which are slit and the material between the slits being bent in alternate directions.

6. An upright for a framed building according to Claim 5, wherein the web portion between the flanges is apertured to provide ventilating openings.

7. A framed building embodying uprights according to any of the preceding claims and in which the foundation is provided with upstanding ridges or flanges delineating the sides of the building, and the lower ends of said uprights are slotted to straddle said ridges.

8. A framed building according to Claim 7, wherein the foundation is provided with a channel member and wherein the web portion of the uprights is slotted to engage the side flanges of the channels.

9. A framed building according to Claim 8, wherein locating means are provided on the foundation member for spacing the uprights the required distance apart for the width of the slab or panel to be employed.

10. A framed building according to Claim 9, wherein the upper and lower ends of the uprights are accurately spaced apart along a top horizontal channel member and along a prefabricated foundation by pin-and-socket connections.

11. A framed building according to Claim 8 and Claim 10, wherein the aforesaid pin-and-socket connections comprise pins accurately spaced apart along the web portions of the channels, and wherein laterally extending lugs formed on or attached to said uprights are drilled to receive said pins.

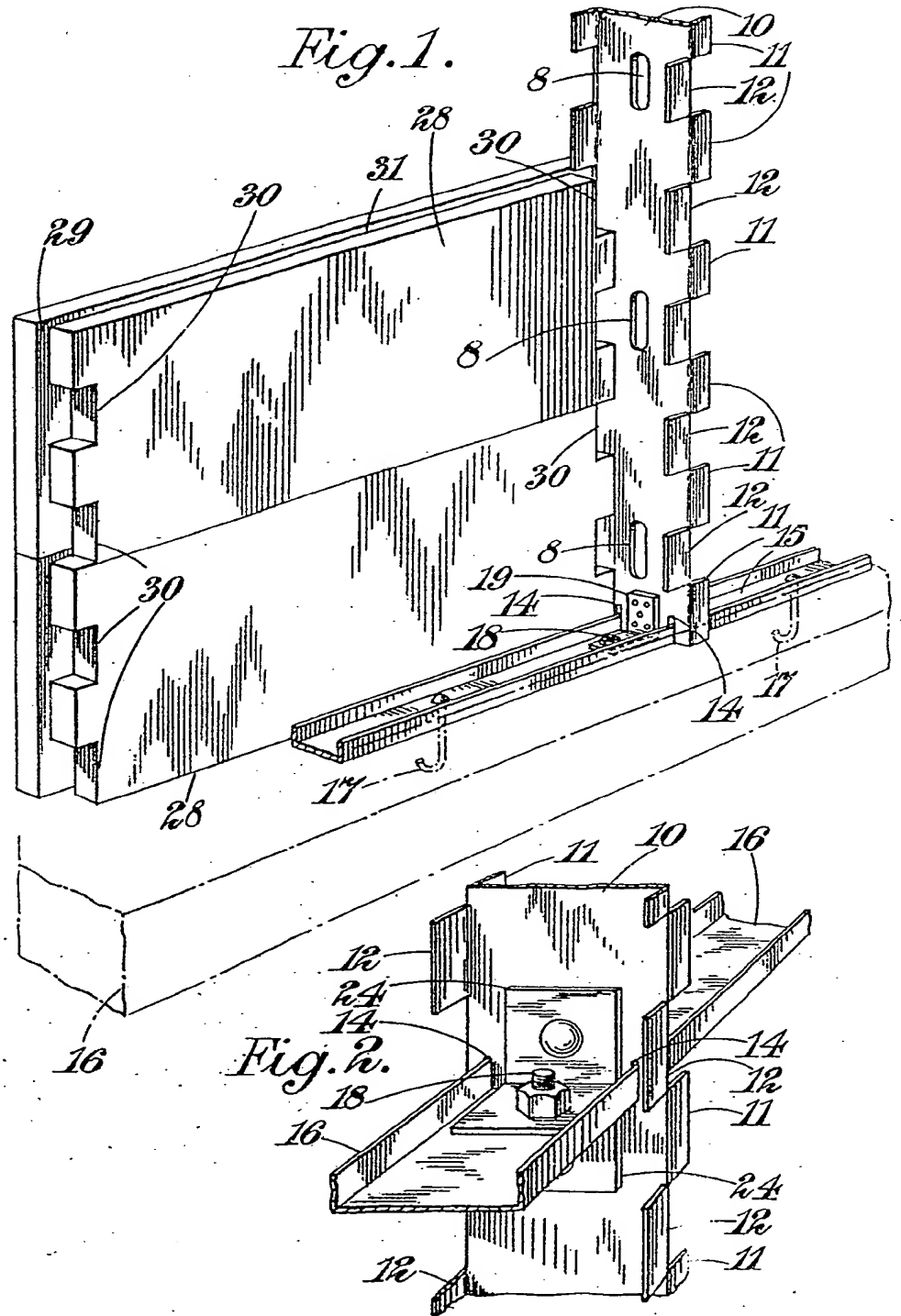
12. A framed building according to Claim 11, wherein the ends of the uprights are provided with two oppositely



- extending drilled lugs or e pieces, and wherein at each location on the channel members, where the uprights are to be erected, two pins or bolts are provided. 50
13. A framed building according to Claim 12, wherein two or more channels are provided which are arranged to overlap at the locations where the uprights are to be erected, and wherein the pins or bolts for locating the uprights are arranged to fulfil the additional function of securing the channel members together. 55
14. A framed building according to Claim 13, wherein those ends of the channel members which are to overlap, are each provided with a hole and a pin so spaced apart that the pin on each channel engages a hole on the other channel, and so that the two pins are spaced the required distance apart for engaging the holes and the lugs or angle pieces on the uprights. 60
15. A framed building according to any of Claims 12 to 14, and in which the uprights are each provided with two flanges for engaging two sets of slabs to form a double wall, wherein the width of the aforesaid channel members is such that they lie between the two sets of the slabs, preferably to provide a gap. 65
16. A multi-storey framed building according to the preceding Claims 10-15, wherein separate uprights are provided for each storey, and are arranged one above the other, either in line or in staggered relationship, and abut on either side of said top channel members, which extend across their ends. 70
17. A multi-storey framed building according to Claim 16, and any of Claims 11 to 15 wherein the aforesaid pins or bolts extend through lugs or angle pieces at the upper ends of the uprights to the webs of the channel members, and through the lugs or angle pieces at the lower ends of the uprights the next storey. 75
18. A framed building according to any of the preceding claims, wherein the adjacent upright members nearest the corners of the structure are cross-braced. 80
19. A framed building according to Claim 18, wherein the cross-braces comprise rods, the ends of which are arranged to constitute the pins or bolts which engage the lugs at the ends of the uprights. 85
20. An upright according to any of the preceding Claims 5 to 19, wherein the slits are arranged to be V-shaped so that each part of the interrupted flange is tapered, thereby facilitating the assembly of the slabs. 90
21. A slab for use in a framed building having uprights with interrupted flanges, which slabs are provided with grooves along opposite side edges, one wall of each of which grooves is gapped so as to enable it to be passed laterally through the interrupted flange of an upright. 95
22. A slab according to Claim 21, wherein the top and/or bottom edges of each slab are provided with a channel, preferably V-shaped in cross-section. 100
23. A slab according to any of Claims 20 to 22, and for use in forming a double wall, wherein the inner faces of the slabs are recessed. 105
24. A framed building substantially as described with reference to the accompanying drawings. 110
25. An upright having gapped flanges substantially as described with reference to the accompanying drawings. 115
26. A slab substantially as described with reference to the accompanying drawings. 120

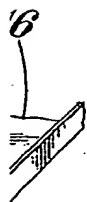
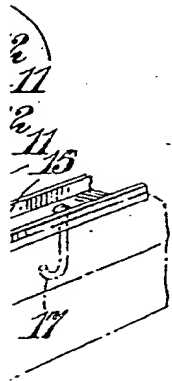
Dated this sixth day of June, 1946.  
**BOULT, WADE & TENNANT,**  
 111 & 112, Hatton Garden,  
 London, E.C.1.  
 Chartered Patent Agents.

[This Drawing is a reproduction of the Original on a reduced scale.]



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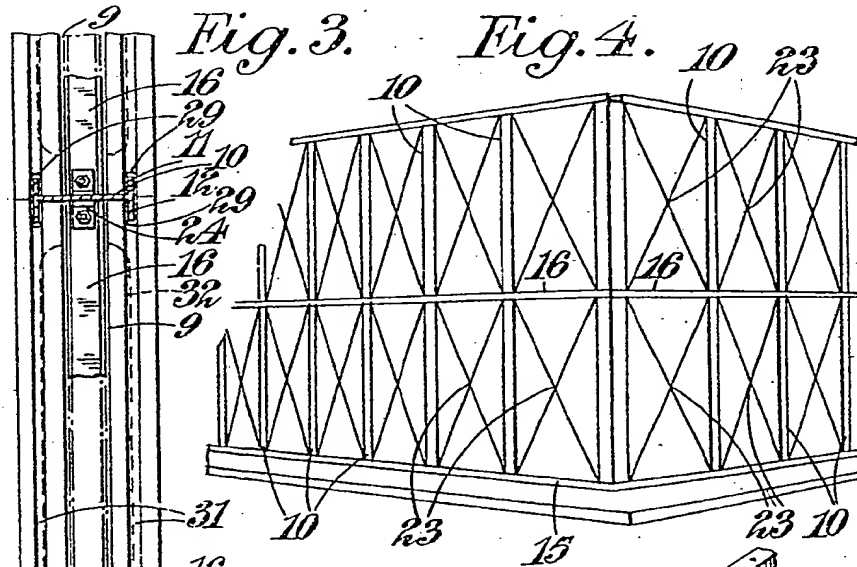


Fig. 6.

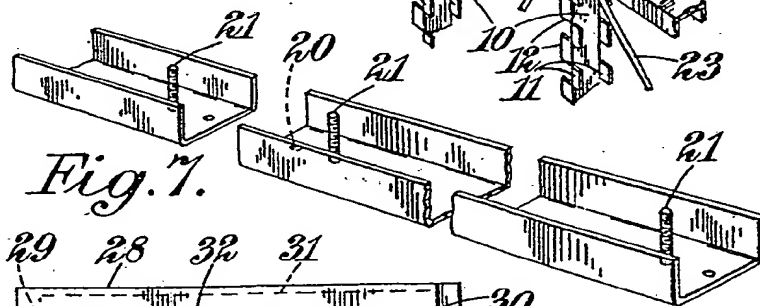
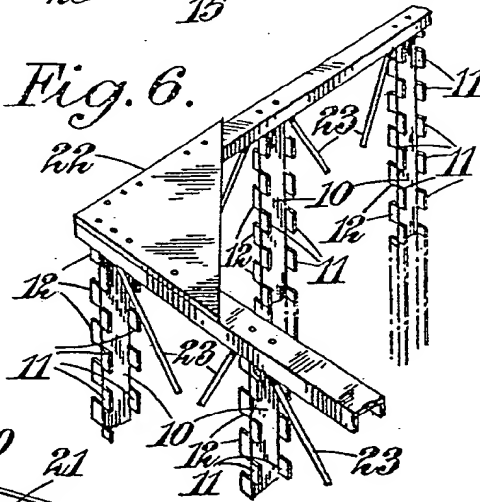


Fig. 7.

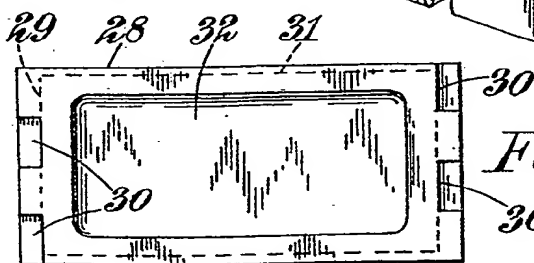


Fig. 9.

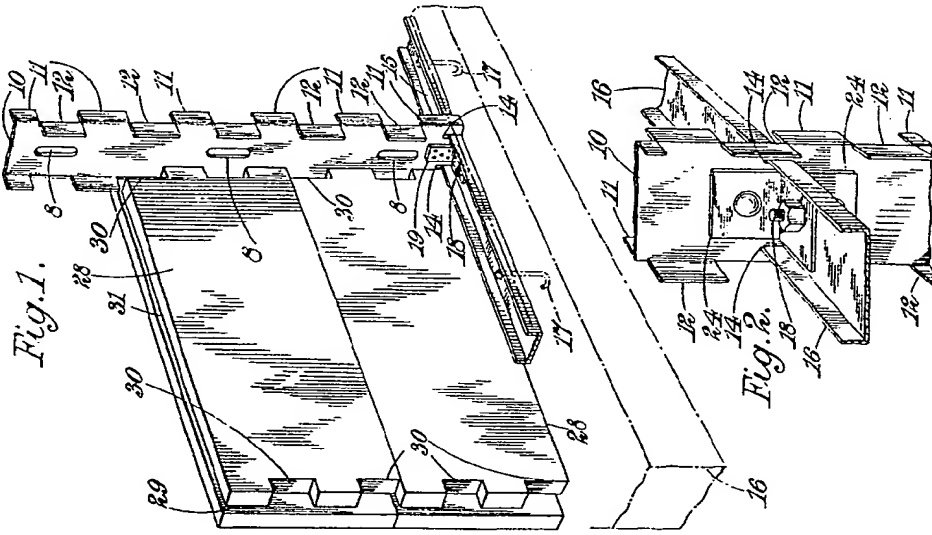


Fig. 1.

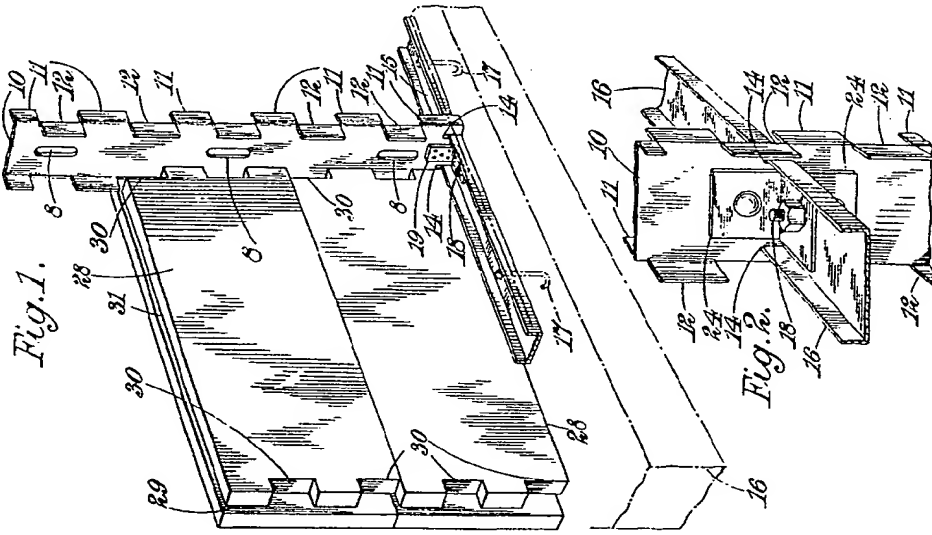


Fig. 2.

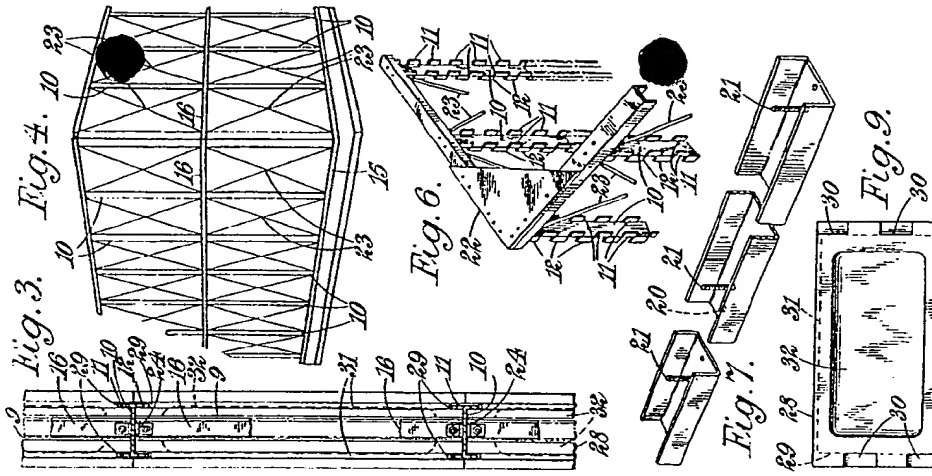


Fig. 3.

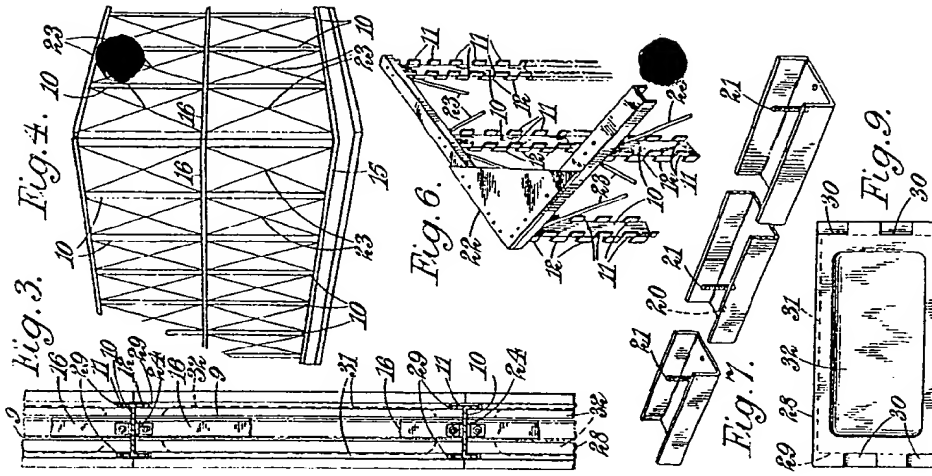


Fig. 4.

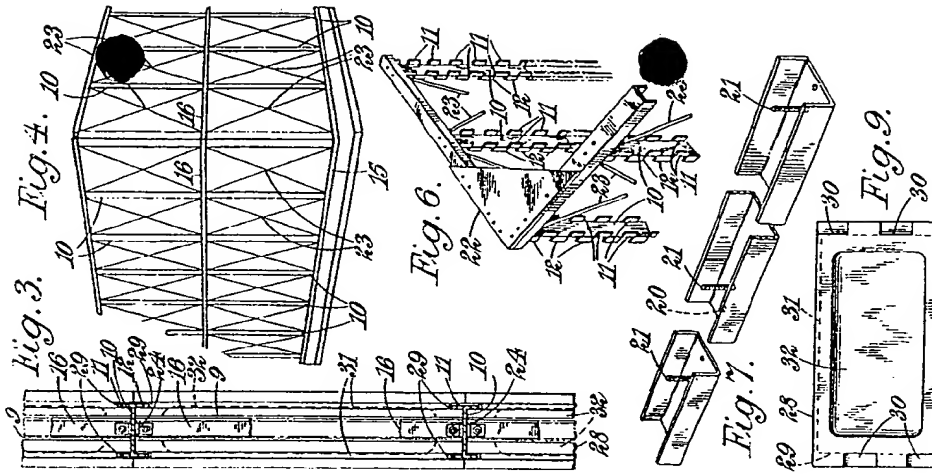


Fig. 5.

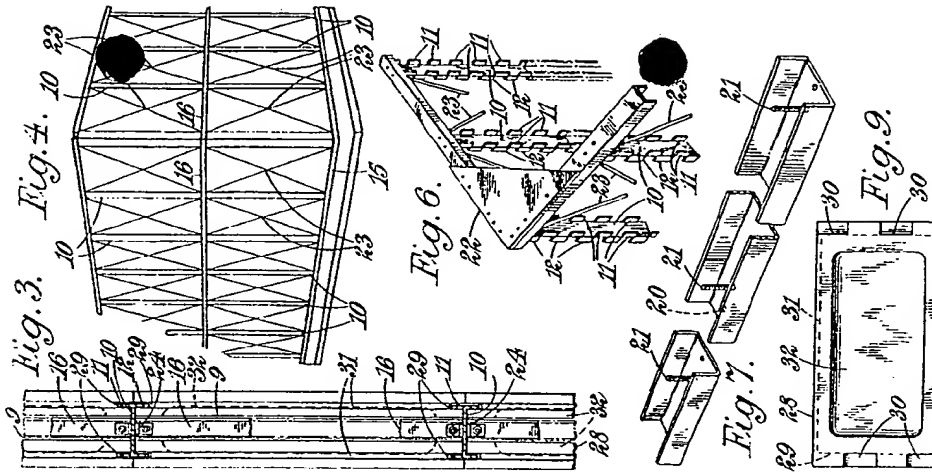


Fig. 6.

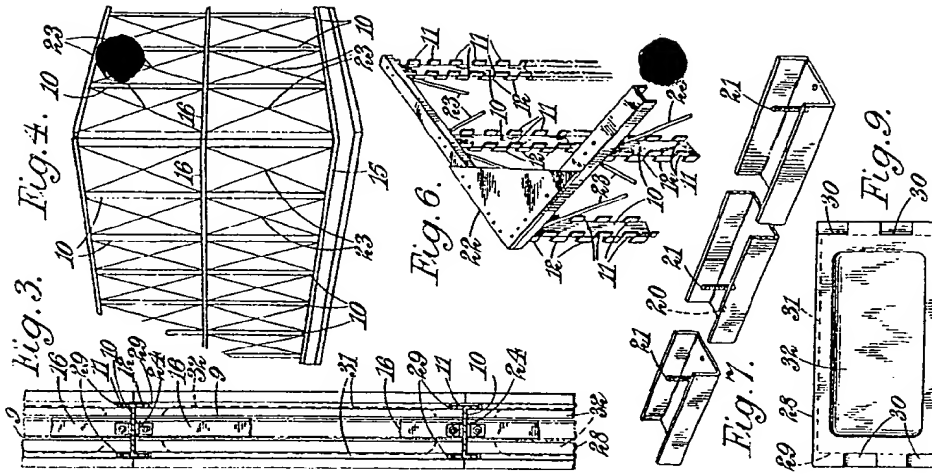


Fig. 7.

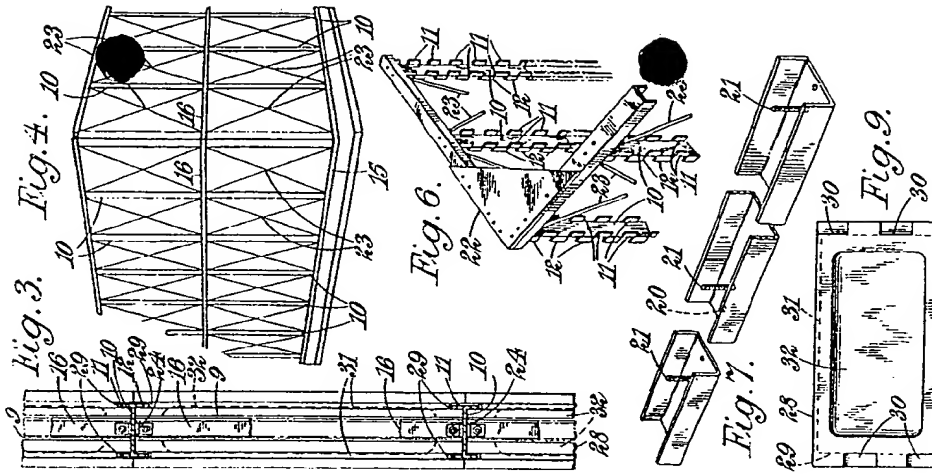


Fig. 8.

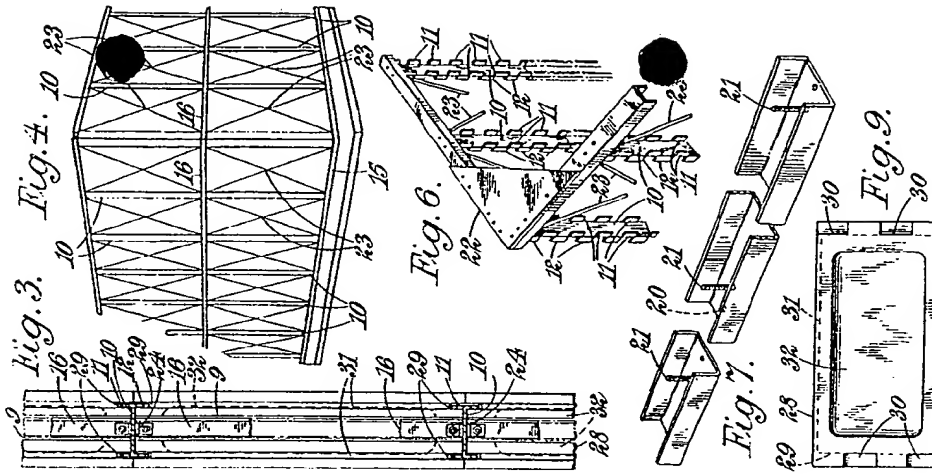
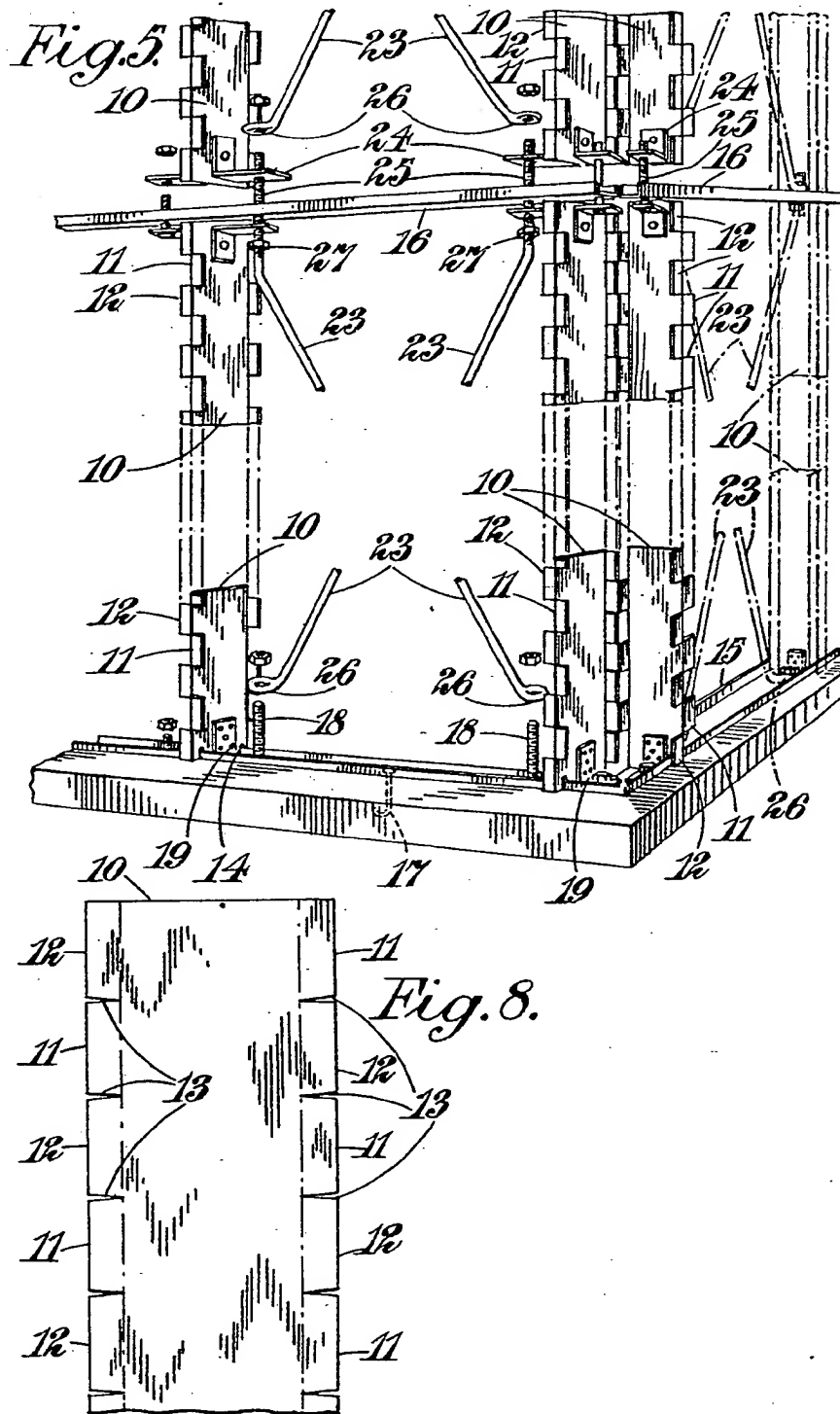


Fig. 9.

This Drawing is a reproduction of the Original on a reduced scale.

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